WHAT IS CLAIMED IS:

1   1.   A method for discovering a topology of a switch from an initiator device,

2 wherein the switch includes a plurality of switch ports, wherein a plurality of

3 Input/Output (I/O) devices are connected to the switch ports, wherein each I/O device

4 and the initiator device connect to the switch through one of the switch ports, wherein the

5 initiator and I/O devices communicate on a first network configured by the switch,

6 wherein the initiator device communicates with the switch over a second network, and

7 wherein the initiator device performs:

8   submitting a first query over the first network to the switch requesting a unique

9 address of a plurality of I/O devices that are accessible to the initiator device over the

10 first network;

11   receiving, in response to the first query to the switch on the first network, the

12 unique address of each I/O device from the switch;

13   submitting a second query over the second network to the switch for information

14 on switch ports on the switch;

15   receiving, in response to the second query to the switch over the second network,

16 the information on the switch ports; and

17   generating information on a topology of the switch ports and the initiator and I/O

18 devices having the unique address.

1   2.   The method of claim 1, wherein at least one I/O device is attached to a

2 loop, wherein the loop is attached to the switch port through which the device connects to

3 the switch.

1   3.   The method of claim 2, wherein each loop comprises a Fibre Channel

2 Arbitrated Loop, and wherein each unique address comprises an eight bit Arbitrated

3 Loop Physical Address.

1   4.   The method of claim 2, further comprising:

2   receiving, in response to the first query to the switch over the first network,

3   switch addresses the switch assigns to the I/O devices attached to the switch ports,

4   wherein the topology information is generated to include the received switch addresses

5   for the I/O devices.

1   5.   The method of claim 4, wherein the switch addresses comprises an

2   Arbitrated Loop Physical Address.

1   6.   The method of claim 1, wherein the first network comprises a Fibre

2   Channel network and wherein the second network comprises an Ethernet network,

3   wherein the switch and less than all of the devices are connected to the second network.

1   7.   The method of claim 1, wherein the unique address for each device is a

2   world wide name (WWN) of the device.

1   8.   The method of claim 1, wherein the switch and switch ports implement

2   segmented loop technology.

1   9.   The method of claim 1, wherein the initiator device further performs:

2   submitting an additional query on the second network to at least one other

3   initiator device connected to one switch port, wherein the at least one other initiator

4   device generates topology information to determine topology information for I/O devices

5   to which the at least one other initiator device is capable of communicating; and

6   updating the topology information with topology information received in response

7   to each additional query on the second network from the at least one other initiator

8   device.

1   10.   The method of claim 9, wherein the topology information received in

2 response to the additional query to the at least one other initiator device is capable of

3 including topology information on I/O devices in different zones implemented by the

4 switch.

1   11.   The method of claim 1, wherein the I/O devices include storage systems

2 and initiator devices.

1   12.   The method of claim 1, wherein there is one unique address for each I/O

2 device and initiator included in the topology information, wherein each I/O device and

3 initiator is capable of including multiple ports.

1   13.   The method of claim 1, wherein there is one unique address for each port

2 in the I/O devices and initiators included in the topology information.

1   14.   The method of claim 13, further comprising:

2   receiving, in response to the first query to the switch over the first network, a

3 switch address assigned to each I/O device port, wherein the generated topology

4 information provides the switch address for each initiator device port and I/O device port.

1   15.   The method of claim 14, further comprising:

2   after obtaining information on all the switch ports on the switch, submitting at

3 least one additional query to the switch for the switch addresses of all I/O device ports

4 connecting to each switch port;

5   receiving, in response to the at least one additional query, the switch address for

6 each I/O device port connecting to each switch port;

7   determining, from the topology information, each I/O device port whose switch

8 address matches one switch address included in the received response to the at least one

9 additional query; and

10   updating the topology information to include the switch port with the I/O device

11   port whose switch address matches one switch address identified in the received response

12   to the third query as connecting to the switch port.

1   16.   The method of claim 15, wherein the topology information is updated for

2   I/O device ports attached to one switch port in the same zone as the initiator device.

1   17.   The method of claim 16, wherein at least one other initiator device

2   generates topology information to determine topology information for I/O devices to

3   which the at least one other initiator device is capable of communicating, further

4   comprising:

5   querying the at least one other initiator device to obtain the topology information

6   generated by the at least one other initiator device; and

7   updating the topology information with topology information received in response

8   to querying the at least one other initiator device, wherein the topology information

9   received from the at least one other initiator device is capable of including I/O devices in

10   other switch zones.

1   18.   A system for discovering a network topology, comprising:

2   (a) a switch having a plurality of switch ports;

3   (b) at least one I/O device, wherein each I/O device is connected to one switch

4   port;

5   (c) an initiator device connected to one switch port;

6   (d) a first network configured by the switch, wherein the initiator and I/O devices

7   communicate on the first network through the switch ports;

8   (e) a second network on which the initiator device and switch communicate;

9   (f) a computer readable medium within the initiator device including code

10   executed by the initiator device, wherein the code causes the initiator device to perform:

11   (i) submitting a first query over the first network to the switch requesting

12   a unique address of a plurality of I/O devices that are accessible to the initiator

13   device over the first network;

14   (ii) receiving, in response to the first query to the switch on the first

15   network, the unique address of each I/O device from the switch;

16   (iii) submitting a second query over the second network to the switch for

17   information on switch ports on the switch;

18   (iv) receiving, in response to the second query over to the switch over the

19   second network, the information on the switch ports; and

20   (v) generating information on a topology of the switch ports and the

21   initiator and I/O devices having the unique address.

1   19.   The system of claim 18, further comprising:

2   a loop attached to one switch port, wherein at least one I/O device is attached to

3   the loop, wherein the loop is attached to the switch port through which the device

4   connects to the switch.

1   20.   The system of claim 19, wherein each loop comprises a Fibre Channel

2   Arbitrated Loop, and wherein each unique address comprises an eight bit Arbitrated

3   Loop Physical Address.

1   21.   The system of claim 19, wherein the code further causes the initiator

2   device to perform:

3   receiving, in response to the first query to the switch over the first network,

4   switch addresses the switch assigns to the I/O devices attached to the switch ports,

5   wherein the topology information is generated to include the received switch addresses

6   for the I/O devices.

1   22.   The system of claim 21, wherein the switch addresses comprises an

2   Arbitrated Loop Physical Address.

1   23.   The system of claim 18, wherein the first network comprises a Fibre

2   Channel network and wherein the second network comprises an Ethernet network,

3   wherein the switch and less than all of the devices are connected to the second network.

1   24.   The system of claim 18, wherein the unique address for each device is a

2   world wide name (WWN) of the device.

1   25.   The system of claim 18, wherein the switch and switch ports implement

2   segmented loop technology.

1   26.   The system of claim 18, further comprising:

2   at least one other initiator device connected to one switch port, and

3   wherein the code further causes the initiator device to perform:

4   (i) submitting an additional query on the second network to at least one

5   other initiator device connected to one switch port, wherein the at least one other

6   initiator device generates topology information to determine topology information

7   for I/O devices to which the at least one other initiator device is capable of

8   communicating; and

9   (ii) updating the topology information with topology information received

10   in response to each additional query on the second network from the at least one

11   other initiator device.

1   27.   The system of claim 26, wherein the topology information received in

2   response to the additional query to the at least one other initiator device is capable of

3   including topology information on I/O devices in different zones implemented by the

4   switch.

1   28.   The system of claim 18, wherein the I/O devices include storage systems
2   and initiator devices.

1   29.   The system of claim 18, wherein there is one unique address for each I/O
2   device and initiator included in the topology information, wherein each I/O device and
3   initiator is capable of including multiple ports.

1   30.   The system of claim 18, wherein there is one unique address for each port
2   in the I/O devices and initiators included in the topology information.

1   31.   The system of claim 30, wherein the code further causes the initiator
2   device to perform:
3   receiving, in response to the first query to the switch over the first network, a
4   switch address assigned to each I/O device port, wherein the generated topology
5   information provides the switch address for each initiator device port and I/O device port.

1   32.   The system of claim 31, wherein the code further causes the initiator
2   device to perform:
3   submitting, after obtaining information on all the switch ports on the switch, at
4   least one additional query to the switch for the switch addresses of all I/O device ports
5   connecting to each switch port;
6   receiving, in response to the at least one additional query, the switch address for
7   each I/O device port connecting to each switch port;
8   determining, from the topology information, each I/O device port whose switch
9   address matches one switch address included in the received response to the at least one
10   additional query; and
11   updating the topology information to include the switch port with the I/O device
12   port whose switch address matches one switch address identified in the received response
13   to the third query as connecting to the switch port.

1   33.   The system of claim 32, wherein the topology information is updated for

2 I/O device ports attached to one switch port in the same zone as the initiator device.

1   34.   The system of claim 33, further comprising:

2   at least one other initiator device generating topology information to determine

3 topology information for I/O devices to which the at least one other initiator device is

4 capable of communicating;

5   wherein the code further causes the initiator to perform:

6   (i) querying the at least one other initiator device to obtain the topology

7 information generated by the at least one other initiator device; and

8   (ii) updating the topology information with topology information received

9 in response to querying the at least one other initiator device, wherein the

10 topology information received from the at least one other initiator device is

capable of including I/O devices in other switch zones.

1   35.   A system for discovering a network topology, wherein an initiator device

2 and at least one I/O device communicate on a first network, and wherein the initiator

3 further communicates on a second network, comprising:

4   (a) a switch having a plurality of switch ports, wherein each I/O device and

5 initiator device are connected to one switch port, wherein the wherein the switch includes

6 code to perform:

7   (i) configuring the first network, wherein the initiator and I/O devices

8 communicate on the first network through the switch ports;

9   (ii) communicating with the initiator device on the second network;

10   (b) a computer readable medium including code executed by the initiator device

11 including code executed by the initiator device, wherein the code causes the initiator

12 device to perform:

13   (i) submitting a first query over the first network to the switch requesting

14   a unique address of a plurality of I/O devices that are accessible to the initiator

15   device over the first network;

16   (ii) receiving, in response to the first query to the switch on the first

17   network, the unique address of each I/O device from the switch;

18   (iii) submitting a second query over the second network to the switch for

19   information on switch ports on the switch;

20   (iv) receiving, in response to the second query over to the switch over the

21   second network, the information on the switch ports; and

22   (v) generating information on a topology of the switch ports and the

23   initiator and I/O devices having the unique address.

1   36.   The system of claim 35, wherein the loop is attached to the switch port

2   through which the device connects to the switch.

1   37.   The system of claim 36, wherein the code further causes the initiator

2   device to perform:

3   receiving, in response to the first query to the switch over the first network,

4   switch addresses the switch assigns to the I/O devices attached to the switch ports,

5   wherein the topology information is generated to include the received switch addresses

6   for the I/O devices.

1   38.   The system of claim 35, wherein additional initiator devices are connected

2   to switch ports on the switch, wherein the code further causes the initiator device to

3   perform:

4   submitting an additional query on the second network to at least one other

5   initiator device connected to one switch port, wherein the at least one other initiator

6   device generates topology information to determine topology information for I/O devices

7   to which the at least one other initiator device is capable of communicating; and

8   updating the topology information with topology information received in response

9   to each additional query on the second network from the at least one other initiator

10   device.

1   39.   The system of claim 38, wherein the code further causes the initiator

2   device to perform:

3   receiving, in response to the first query to the switch over the first network, a

4   switch address assigned to each I/O device port, wherein the generated topology

5   information provides the switch address for each initiator device port and I/O device port.

1   40.   The system of claim 32, wherein the topology information is updated for

2   I/O device ports attached to one switch port in the same zone as the initiator device.

1   41.   The system of claim 40, wherein at least one other initiator device

2   generates topology information to determine topology information for I/O devices to

3   which the at least one other initiator device is capable of communicating, wherein the

4   code further causes the initiator to perform:

5   querying the at least one other initiator device to obtain the topology information

6   generated by the at least one other initiator device; and

7   updating the topology information with topology information received in response

8   to querying the at least one other initiator device, wherein the topology information

9   received from the at least one other initiator device is capable of including I/O devices in

10   other switch zones.

1   42.   An article of manufacture including code for discovering a topology of a

2   switch from an initiator device, wherein the switch includes a plurality of switch ports,

3   wherein a plurality of Input/Output (I/O) devices are connected to the switch ports,

4   wherein each I/O device and the initiator device connect to the switch through one of the

5   switch ports, wherein the initiator and I/O devices communicate on a first network

6   configured by the switch, wherein the initiator device communicates with the switch over

7   a second network, and wherein the code causes the initiator device to perform:

8   submitting a first query over the first network to the switch requesting a unique

9   address of a plurality of I/O devices that are accessible to the initiator device over the

10   first network;

11   receiving, in response to the first query to the switch on the first network, the

12   unique address of each I/O device from the switch;

13   submitting a second query over the second network to the switch for information

14   on switch ports on the switch;

15   receiving, in response to the second query to the switch over the second network,

16   the information on the switch ports; and

17   generating information on a topology of the switch ports and the initiator and I/O

18   devices having the unique address.

1   43.   The article of manufacture of claim 42, wherein at least one I/O device is

2   attached to a loop, wherein the loop is attached to the switch port through which the

3   device connects to the switch.

1   44.   The article of manufacture of claim 43, wherein each loop comprises a

2   Fibre Channel Arbitrated Loop, and wherein each unique address comprises an eight bit

3   Arbitrated Loop Physical Address.

1   45.   The article of manufacture of claim 43, wherein the code further causes

2   the initiator device to perform:

3   receiving, in response to the first query to the switch over the first network,

4   switch addresses the switch assigns to the I/O devices attached to the switch ports,

5   wherein the topology information is generated to include the received switch addresses

6   for the I/O devices.

1   46.   The article of manufacture of claim 45, wherein the switch addresses

2 comprises an Arbitrated Loop Physical Address.

1   47.   The article of manufacture of claim 42, wherein the first network

2 comprises a Fibre Channel network and wherein the second network comprises an

3 Ethernet network, wherein the switch and less than all of the devices are connected to the

4 second network.

1   48.   The article of manufacture of claim 42, wherein the unique address for

2 each device is a world wide name (WWN) of the device.

1   49.   The article of manufacture of claim 42, wherein the switch and switch

2 ports implement segmented loop technology.

1   50.   The article of manufacture of claim 42, wherein the initiator device further

2 performs:

3   submitting an additional query on the second network to at least one other

4 initiator device connected to one switch port, wherein the at least one other initiator

5 device generates topology information to determine topology information for I/O devices

6 to which the at least one other initiator device is capable of communicating; and

7   updating the topology information with topology information received in response

8 to each additional query on the second network from the at least one other initiator

9 device.

1   51.   The article of manufacture of claim 50, wherein the topology information

2 received in response to the additional query to the at least one other initiator device is

3 capable of including topology information on I/O devices in different zones implemented

4 by the switch.

1   52.   The article of manufacture of claim 42, wherein the I/O devices include

2   storage systems and initiator devices.

1   53.   The article of manufacture of claim 42, wherein there is one unique

2   address for each I/O device and initiator included in the topology information, wherein

3   each I/O device and initiator is capable of including multiple ports.

1   54.   The article of manufacture of claim 42, wherein there is one unique

2   address for each port in the I/O devices and initiators included in the topology

3   information.

1   55.   The article of manufacture of claim 54, wherein the code further causes

2   the initiator device to perform:

3   receiving, in response to the first query to the switch over the first network, a

4   switch address assigned to each I/O device port, wherein the generated topology

5   information provides the switch address for each initiator device port and I/O device port.

1   56.   The article of manufacture of claim 55, wherein the code further causes

2   the initiator device to perform:

3   after obtaining information on all the switch ports on the switch, submitting at

4   least one additional query to the switch for the switch addresses of all I/O device ports

5   connecting to each switch port;

6   receiving, in response to the at least one additional query, the switch address for

7   each I/O device port connecting to each switch port;

8   determining, from the topology information, each I/O device port whose switch

9   address matches one switch address included in the received response to the at least one

10   additional query; and

11   updating the topology information to include the switch port with the I/O device

12   port whose switch address matches one switch address identified in the received response

13   to the third query as connecting to the switch port.

1   57.   The article of manufacture of claim 56, wherein the topology information

2   is updated for I/O device ports attached to one switch port in the same zone as the

3   initiator device.

1   58.   The article of manufacture of claim 57, wherein at least one other initiator

2   device generates topology information to determine topology information for I/O devices

3   to which the at least one other initiator device is capable of communicating, wherein the

4   code further causes the initiator device to perform::

5   querying the at least one other initiator device to obtain the topology information

6   generated by the at least one other initiator device; and

7   updating the topology information with topology information received in response

8   to querying the at least one other initiator device, wherein the topology information

9   received from the at least one other initiator device is capable of including I/O devices in

10 other switch zones.